

## ABSTRACT

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**AUTHOR:** LTC Thomas D. Bortner

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**1993  
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S104**

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IS THE DEPARTMENT OF DEFENSE PARTS CONTROL PROGRAM EFFECTIVELY ADMINISTERED THROUGH THE MILITARY PARTS CONTROL ADVISORY GROUPS?

CONSIDERING THE CURRENT BUILDDOWN, REDUCTION OF THE DEFENSE INDUSTRIAL BASE, AND THE LOSS OF PRODUCERS AND SUPPLIERS, IS THE DEPARTMENT OF DEFENSE MAXIMIZING THE BENEFITS OF PARTS SPECIFICATIONS AND STANDARDIZATION?

### INTRODUCTION

In a 29 August 1983 memorandum, the Secretary of Defense directed a series of actions to correct long-standing problems in spare parts acquisition. Part of this memorandum included the Department of Defense Parts Control Program (DOD PCP). The memorandum directed that Department of Defense procedures be revised to require mandatory application of the DOD PCP on all applicable contracts (development and production), in accordance with the memorandum and Department of Defense Instruction (DODI) 4120.19.<sup>1</sup> Prior to that date, DODI 4120.19, "Department of Defense Parts Control System," dated 16 December 1976 and revised 11 June 1981, was the basis for the DOD PCP.<sup>2</sup> That DODI amplified DOD policies, objectives and responsibilities in the area of parts control from two underlying references:<sup>3</sup>

- o Title 10, United States Code, Chapter 145, "Cataloging and Standardization."

- o Department of Defense Directive 4120.3, "Department of

Defense Standardization Program," 6 June 1973.

As an integral part of the DOD Standardization Program, Military Standard 965, "Parts Control Program," when included in applicable contracts, provides the procedures for implementing the program.<sup>4</sup> However, until the 29 August 1983 Secretary of Defense Memorandum directed a revision to reinforce DOD procedures and reflect the change to a **mandatory** application of the program, DODI 4120.19 was not working the way it was intended to function. Procedures were not adequate to:

- Ensure parts control review was included in applicable contracts;
- Ensure contracts were monitored for compliance;
- Review and improve the program;
- Properly report results.<sup>5</sup>

An audit report published by the DOD Inspector General in February 1985 was based on an overall evaluation of the DOD PCP between November 1983 and May 1984. It specifically:

- (1) Evaluated controls to ensure applicable contracts were included in the program;
- (2) Evaluated review procedures for those contracts which were included the program;
- (3) Determined if savings were being achieved.<sup>6</sup>

The detailed information, findings and recommendations contained in that 40 page report were picked up by the news media. According to a Washington Dateline by the Associated Press,



"Efforts to standardize the military's spare parts inventory are being hampered by poor reviewing procedures, an internal Pentagon audit says. In a report by the Pentagon's Office of Inspector General, the Defense Department is not reviewing all its contracts to root out the cause of non-standard parts. The Pentagon also is doing a questionable job in many of its parts control reviews and is not forcing contractors to use standard parts even when a review determines they should, the audit said. Because of these problems, the Pentagon is not saving as much money as it claims in reports to Congress, the audit said."<sup>7</sup>

The Associated Press article was followed on 4 April 1985 by another article, written by Mr. Richard Halloran in a special to the New York Times. The Halloran article focused on two points:

1 - "an internal DOD audit asserts that orders to standardize the purchase of spare parts have been largely ignored,"

2 - "savings from the program have been significantly overstated."<sup>8</sup>

As is often the case of news articles which are trying to walk that fine line between objective reporting for balance and accuracy and sensational coverage to sell newspapers, the Halloran article highlights mostly the failure versus the success, albeit somewhat limited, of the program. What really led to this situation and these articles?

### THE REAL INTRODUCTION

Whenever new Department of Defense hardware enters the inventory, thousands of new repair parts and various types of support equipment will usually follow. Considering the

complexity of new acquisitions and the variety across all government agencies, especially the military departments, this can bring literally hundreds of thousands of new parts annually which must be reviewed and processed for national stock number assignment and logistical support. Of course, those which can be readily identified as already in the inventory will be matched to prevent unnecessary stock number proliferation. Those not matching existing stocks, i.e. nonstandard, must also be processed. To control this flow, DOD has employed a number of techniques with varying success. In retrospect, all methods have shared one basic shortcoming: they were subject to configuration constraints because they were accomplished after the hardware had been designed. For example, drawings, technical manuals and so forth would have to be revised simply to accommodate a like part which would perform exactly the same function, but which had not been documented earlier in the acquisition process.<sup>9</sup>

Certainly, the desire to control item proliferation was not new to government or industry. What is relatively new is the recognition that the design phase is the most effective time to prevent unneeded parts from entering the supply system. There is a logical reason that this point was overlooked, indeed, perhaps intentionally. Designers are generally visionary, and standardization may be thought of as the antithesis to the free thinking associated with state-of-the-art type developments. Even the suggestion of standardization could inhibit the process and be detrimental to advancements, or so a designer might argue.

Traditionally, item entry control was done by screening parts when they were being provided to the production line. Item reduction was accomplished by screening the existing inventory. While both of these methods were somewhat beneficial, they seemed to put the cart before the horse.<sup>10</sup> Both occurred far too late in the process to have much effect. At this point, both were often more costly and the tendency was not to change, but to remain with the status quo.

Based on these needs, DOD introduced a parts control system to provide parts standardization during the design phase, when it is most effective. The significant advantage of this program is that it recognizes the need for a central point of contact with responsibility for providing parts control support to military procuring activities and contractors. The program was originally intended to:

- (1) Minimize the variety of parts used in new designs.
- (2) Enhance system reliability and maintainability through the use of reliable parts.
- (3) Keep specifications and standards current with the state of the art.<sup>11</sup>

This research will provide some insight into the background and developments in specification and standardization control. Then it will look in some depth at the program which has made significant progress in commodity-oriented standardization. The administration and accomplishments of the program will be reviewed. There will be conclusions about the efficiency and

effectiveness of the program. Finally, based on the current state of the economy and military, appropriate recommendations for improvements will be offered.

## BACKGROUND

### Specifications and standards

A specification is a clear and accurate description of the technical requirements for a material, a product or a service, including the procedure by which it can be determined that the requirements are met. It may also be defined as a statement containing a minute description, drawing or enumeration of particulars, such as details of construction.<sup>12</sup> Military use of specifications often refer to them as a Military Specification or MIL-SPEC.

Standards are descriptions which establish engineering or technical limitations and applications for materials, processes, methods, designs, or drafting room and other engineering practices, or any related criteria deemed essential to achieve the highest practical degree of uniformity in materials or products, or interchangeability of parts used in those products; and which may be used in specifications, invitations for bids, proposals, and contracts.<sup>13</sup> Just as in specifications, the military use of a standard became Military Standard or MIL-STD.

The use of specifications gives clarity to a requirement. The application of specifications to as large a number of items

as possible results in a high degree of standardization. The use of specifications and standards brings:

- (1) Uniformity and interchangeability of equipment;
- (2) Standardization in manufacture, packaging, inspection, and acceptance;
- (3) Uniform terminology for accurate description.

To accomplish these objectives, in the case of items or components for which there is a continuing demand, specifications and standards describing the lowest, feasible number of types and kinds of equipment are published with identifying numbers, such as manufacturer's numbers, part numbers or stock numbers.

When did this desire for consistency begin?

Evidence of standardization as an ancient discipline abounds in many ways, whether looking at art forms, everyday implements, or remnants of known processes. Industrialization brought many forms of applied standards to the design, development and production of an increasing proliferation of items and equipment. Early proponents of the benefits accruing to standardization were probably epitomized by Henry Ford's mass production process. It revolutionized the assembly line process and demonstrated the significant advantages of standardization, both of processes and items.

In the military, owing to its very nature, standardization is quite natural. One of the major impediments to increasing productivity is wasted time and material. Thus various forms of

controlling the use and consumption of each is fundamental. Likewise, some control of parts and components should occur routinely as a matter of good business. Industry and government recognized the value of good standardization practices. Reduction in variety usually allows reduced costs, longer production runs, better quality assurance, and ultimately, potential for a better, less expensive product. However, these practices varied among and within the services and industry. The technique most often used to justify a nonstandard part was described in MIL-STD-749, "Preparation and Submission of Data for Approval of Nonstandard Parts."<sup>14</sup>

Contractors often found it easier to simply default to MIL-STD-749 rather than try to identify an existing standard item. While this was a lengthy process, requiring weeks for approval, the myriad of parts and lack of a coherent, workable, effective system didn't allow contractors to do otherwise. Each military service and often procuring activities within the same services did not agree on what constituted a "standard" part, differed greatly on the application of MIL-STD-749, and often were short manpower to properly review paperwork submitted.<sup>15</sup>

A variety of studies and reports during the 1960s highlighted the need for standardization due to increased costs from the proliferation of component parts for new equipment.

"A Study of the Department of Defense Standardization Program, prepared by the Logistics Management Institute (LMI) in November 1963, concluded that the combined cost to a contractor and the government of adding a new item to the supply system was between \$3000 and \$4000, if data, qualification, test and supply logistics costs were included. To be conservative, the LMI

report used \$1500 savings as a combined government/contractor amount when a standard part was used in lieu of a nonstandard part in design."<sup>16</sup>

#### Control parts to control costs

Controlling parts proliferation at any time in the life cycle of equipment will reduce costs and directly affect the availability and affordability of military equipment. There are several elements which cause costs to increase, sometimes called "cost drivers." These mostly revolve around costs to document, costs to test, and performance costs.<sup>17</sup> These will be examined in more detail later, but were clearly and specifically identified early in the development of the program as critical elements having the most significant impact, especially if addressed during the design phase.

It was with the reduction of these costs in mind that David Packard in 1971, as Deputy Secretary of Defense, directed a pilot study be conducted to determine the feasibility of a parts control system. The program was to optimize the use of standard and preferred parts in newly designed equipment by using the technical expertise of Defense Logistics Agency (DLA) engineers already at work in piece part standardization.<sup>18</sup>

#### Control parts during design

If the design phase is logically the most desirable time to implement parts control, then why wasn't it being routinely done? The common thread flowing through the study efforts in the 1960s

was that component part standardization documents were not responsive to technological change, and standard parts that were available were not known to the designer.

"Prior to parts control, a fallacy in parts standardization during design was the absence of uniform techniques to assure the optimum application of standard parts among and between the military services. Because of this fallacy, the acquisition manager on many occasions acquiesced to the pressures of cost and time by allowing many nonstandard parts to be designed into new military equipment. The unhappy results of this lack of standardization during design was poor equipment reliability in the field and excessive proliferation of nonstandard parts in DOD logistics inventories."<sup>19</sup>

The key to making this whole process work began with the equipment designer. If they would not expend the necessary effort to make the control function work, the whole process would remain suboptimized. But would the designers feel that their creative energies were being stifled? Could the designers be convinced that such a system was in their best interests and actually allow them more time for creativity? Experts studying the problem of electronic piece parts standardization were convinced that the equipment designer would use standard parts provided he could be assured of several things.

1. Conveniently determine which available standard parts would meet his required application.
2. Easily communicate his electronic parts needs to a knowledgeable parts specialist and receive a fast response.
3. Be assured that controls for component selection and use of standard parts would not stifle his freedom of choice and compromise his circuit design.<sup>20</sup>



### Improvements continued

In July 1974, at the request of the Deputy Secretary of Defense, the Defense Science Board created a task force on specifications and standards to answer the types of questions and issues posed above. With representation from the Office of the Secretary of Defense, the military departments, the DLA and industry, the task force had as its primary objective the development of recommendations for improving the origination, generation, maintenance, and application of specifications and standards.<sup>21</sup>

The task force found that although some improvement in the substantive content of military and federal specifications and standards was possible in all areas, the benefits derived from such improvement would not be as significant or achievable in the near term as those which could be achieved from an improved climate of application. Based on these findings, the task force recommended a twofold approach to improve the climate for applying specifications and standards.

1. It should advocate increased emphasis on tailoring requirements to specific system needs prior to contractual application. Specifications and standards reviews, for example, should be conducted by the government prior to issuing the request for proposals, ensuring that only essential requirements are invoked. In concert with the design-to-cost philosophy, contractor flexibility should be promoted and encouraged.

2. It should strengthen top-level DOD management of

specifications and standards. The task force concluded that closer management attention should be aimed at controlling the format, content, and proliferation of those specifications and standards that had the greatest potential for misuse. Improved feedback mechanisms should be developed to couple specification preparers with government and industry specification users. New specifications and standards should be structured to facilitate their tailoring.<sup>22</sup>

As a result of the task force's findings, the Deputy Secretary of Defense instructed the Defense Materiel Specifications and Standards Office (DMSSO) and the military departments to review and evaluate the process of establishing technical requirements for inclusion in requests for proposal and contracts. Specific emphasis was to be placed on assuring coordination and interaction among the contributing technologies in those areas known to have a high potential for generating costs. In addition, the Deputy Secretary directed that these organizations should "institute procedures and policies to control blanket contractual imposition of such specifications and standards. Those controls should be structured to force technical activities to tailor requirements to the essential, specific, operational needs of the end item equipment or system."<sup>23</sup>

DOD then took two significant steps to formalize control of the variety of parts used in defense hardware. First, on 16 December 1976, it attempted to establish mandatory use of the

parts control system in the development of major systems and equipment through DOD Instruction 4120.19. As has been noted, this DODI defines the DOD PCP and assigns responsibility to the services for its implementation through the Military Parts Control Advisory Group (MPCAG) located at the DLA supply centers. (More on this organization later.) The instruction stated that the services retain final authority and responsibility for approval of parts used in designs under their cognizance, but required them to negotiate parts control support agreements with DLA to ensure uniform application of parts control techniques in contracts. The PCP shall be required in contracts for new design/modification in major weapons systems, end items of equipment where provisioning and follow-on logistic support will be required, and any other contract in which the procuring DOD component foresees that life cycle benefits can be derived.<sup>24</sup>

There was a major problem with the DODI and its weak implementation. As a policy, final authority still rested with each DOD component. While they were required to act, they were also authorized latitude in selection and use of parts and cost effectiveness. This effectively made it a policy with no teeth.

The second step taken by DOD to formalize parts control was on 15 April 1977 when it published Military Standard 965. This coordinated procedures and requirements for implementation of the PCP, including procedures covering the submission, review, and approval of parts proposed by contractors, together with related documentation. The weapon system/equipment contract statement of

work was required to cite MIL-STD-965 (tailored as appropriate). This set the uniform parts control procedural standard with which the contractor must comply. This standard also identified the federal supply classes (FSCs) for which parts control support was to be provided and indicated that for all other FSCs not specifically noted, parts information could be requested from the appropriate Defense Supply Center.<sup>25</sup>

In the past there had been several military standards which had prescribed different procedures to obtain approval for use of parts. Quite predictably, the effect of having several different procedures in existence at the same time was confusion. Contractors, after having taken the time and effort to understand and comply with one procedure, often discovered that different procedures were imposed upon them contractually. To preclude these situations, it was DOD's intent that MIL-STD-965 be the only method of parts review and approval cited in future contracts.<sup>26</sup>

Meanwhile, the military departments took steps to improve the application and tailoring of specifications and standards. Each established procedures and issued instructions to their subordinate commands for conducting, reviewing, and reporting tailoring activity. Concurrently, the acquisition regulations at that time (Armed Services Procurement Regulation) were revised to mandate the tailoring of specifications and standards and the feedback of contractual changes affecting them.

Also in April 1977, DOD Directive 4120.21, "Specifications

and Standards Application," was issued. This directive required all DOD components to establish specific, continuing management controls over the utilization of specifications, standards, and related technical data in the acquisition process. Controls had to be properly applied and tailored to reflect the minimal, essential requirements for the particular system. In addition, the directive specified that existing management review boards assure that tailoring was accomplished, that records were maintained as to the degree of the accomplishment, and that feedback was requested from potential contractors during the solicitation stage.<sup>27</sup>

#### COMMODITY ORIENTED STANDARDIZATION

##### The birth of Military Parts Control Advisory Group

As has been noted, the attention directed toward controlling standardization and specifications was certainly not new. As early as 1968, the Assistant Secretary of Defense (Installations and Logistics) had directed the establishment of a program to maximize the use of DOD standard items.

In 1968, the Air Force had established a parts control board for the F-111 aircraft and requested engineers from DLA's Defense Electronics Supply Center (DESC) in Dayton, Ohio, to advise the board on electronic parts selection. The benefits of this program caught the attention of the DOD study group chartered to find ways to more effectively control item proliferation. Using

this Air Force experience as a basis, the study group developed procedures and recommended the pilot test which would verify the benefits of parts control on various types of contracts. Eight high-growth, electronic FSCs managed by DESC were chosen for the test, and DESC was designated as the first MPCAG.<sup>28</sup>

Encouraged by the test, the services agreed to have DLA perform parts control through DESC. In April 1971, the pilot program was approved for DESC, and in September 1973, a similar program was approved for Defense Industrial Supply Center (DISC) in Philadelphia, Pennsylvania, to handle fasteners and bearings, the second largest growth area in the DOD inventory.

In June 1978, the program was expanded to include Defense Construction Supply Center (DCSC) in Columbus, Ohio, for gears, belts, hoses, tubes, fittings and valves, and for the Defense General Supply Center (DGSC) in Richmond, Virginia, for lugs, terminals, insulators, cables, lamps and lighting fixtures. As the four supply centers expanded their operations, more and more FSC commodities were to be subjected to the PCP. (A complete list of responsible Military Parts Control Advisory Groups and the FSCs assigned can be found in MIL-STD-965a.)

#### The MPCAG organization

Each DLA MPCAG consists of professional engineers and experienced technicians who have the latest information available on standard parts and who can quickly disseminate this information to government agencies for their contractors on

request.<sup>29</sup>

Each MPCAG is responsible for an internal procedure to accomplish the DLA objective to assist DOD contractors with advice and recommendations on the selection of standard parts for use in new systems and equipment design. In conjunction with this activity, a MPCAG may be authorized by a DOD component to act as their agent in preparing specifications or standards needed for new technology parts that have the potential for common use. MPCAGs will:

- o Have a broad engineering data base for selected parts control commodities to assist design engineers in making parts control recommendations;

- o Develop and maintain procedures to process the rapid interchange of parts information and documentation between contractor design engineers, government program managers, themselves, and the DOD logistics system;

- o Support DOD needs for program parts selection lists and development of parts documentation and provide automation support for program parts selection lists;

- o Solicit and use, as appropriate, MPCAG evaluations of the suitability of parts control proposals submitted by contractors.<sup>30</sup>

While the MPCAG certainly does not work directly for the military Program Manager (PM) having responsibility for the system/equipment under contract, it is often viewed as an extension of the PM technical staff, but only in an advisory

capacity. Both the contractor and the PM have continuous direct access to this large body of professional engineering talent.<sup>31</sup>

To fulfill their portion of the PCP, PMS will assist the MPCAGs in several ways. They will:

(1) Provide MPCAGs with form, fit, and function limitations necessary for parts selection evaluations;

(2) Consider the recommendations of MPCAGs with regard to parts selection;

(3) Solicit and use, as appropriate, MPCAG evaluations of the suitability of parts control proposals submitted by contractors.<sup>32</sup>

MPCAG parts evaluators provide recommendations on parts requests by working under a team concept, with each team responsible for a specific commodity area. By limiting the variety of items each team is responsible for, an evaluator is able to concentrate on a single commodity area and thereby develop an extensive, in-depth knowledge and specialized expertise. Just as MIL-STD-965A specifically delineates the high volume FSCs included under the DOD PCP, each MPCAG further divides or subdivides the FSCs. The FSCs include thousands of parts and are managed as follows.

DEFENSE SUPPLY CENTER

FSCs Managed

Mechanical Parts

Defense Industrial Supply Center (DISC)	15
Defense Construction Supply Center (DCSC)	5



## Electrical and Electronic Parts

Defense Electronics Supply Center (DESC)	25
Defense General Supply Center (DGSC)	16

### The MPCAG operation

The contractor, working with his subcontractors, selects part types for possible use in design. Under MIL-STD-965A, the primary contractor must prepare and submit his list of parts proposed for design selection to the appropriate MPCAG for evaluation. The contractor simultaneously submits this parts data to the acquisition activity. This Program Parts Selection List (PPSL) may contain standard and nonstandard parts and those selected from the Government Furnished Baseline Parts List (GFB/PL).<sup>33</sup> The PPSL becomes the governing document for parts selection on a given contract to:

- control the scope of total parts, e.g. use of one standard bolt versus two similar bolts.
- compress the variety of part types, e.g. use of one standard bolt versus a bolt and a screw.
- direct all personnel associated with the contract to already approved parts, e.g. keep a subcontractor from designing a unique bolt when a suitable bolt is already approved.
- indicate standardization activity, e.g. each bolt listed indicates its source, GFB/PL, standard or nonstandard, and so forth.
- act as an audit tool, e.g. all bolts in use can be

reviewed for compliance with the DOD PCP.<sup>34</sup>

Below is the flow diagram for addition of a candidate part to the PPSL. Military Standard 970, "Order of Preference for the Selection of Standards and Specifications," lists the order of preference and precedence for deciding how to select parts for use in a contract. Parts control procedures shown in the following diagram include (I) simply proposing the part to the acquisition activity, or (II) using a Parts Control Board (PCB).<sup>35</sup>

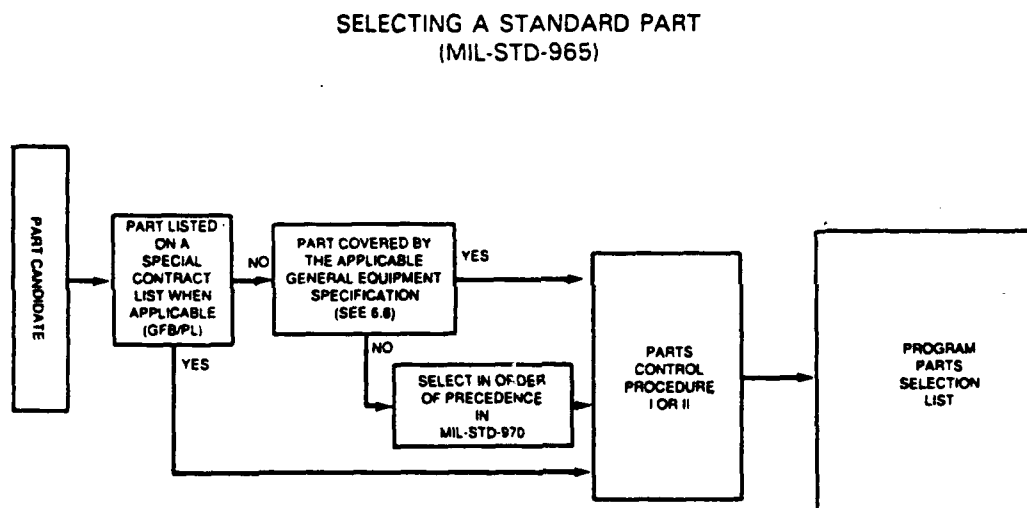


FIGURE 1. Example for Selection of Parts for Program Parts Selection List (PPSL).

The MPCAGs have some unique capabilities and highly refined tools which permit them to make accurate, timely responses to

parts inquiries and review requests. All MPCAGs have access to the various DOD parts data bases, such as the modernized Parts Control Automated Support System(PCASS), which permits rapid access to the thousands of previous parts evaluations on file, thereby ensuring the consistency of recommendations. This system also generates trend analyses on nonstandard part usage so that candidates for standardization documentation can be more readily identified. Additionally, the MPCAGs can prepare and revise standardization documents for the various departments. This means that when good candidates for standardization documentation are identified, action to prepare documentation can be initiated without delay. Adding to the depth of commodity expertise of the MPCAG part evaluators is their required awareness of other ongoing standardization documentation actions. Once the review is complete, the MPCAG forwards its recommendations to both the acquisition activity and the contractor.

Upon approval of the MPCAG recommendations by the acquisition activity, this screened list becomes the approved PPSL. (Since the MPCAG is the subject matter expert on parts standardization, their recommendations are usually accepted and approved "as is" by the acquisition activity.) The approved PPSL is returned to the MPCAG and the contractor. It includes parts covered by military and industry association standardization documentation as well as parts covered by contractor or vendor documentation. Parts contained in unmodified off-the-shelf equipment or unmodified Government Furnished Equipment (GFE) are

not required to be listed. The following figure shows the flow of the PPSL.

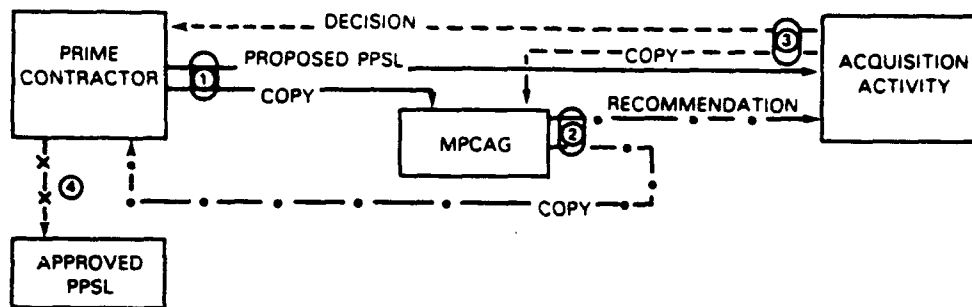


FIGURE 2. Method for Obtaining Approval of Proposed Program Parts Selection List (PPSL)

In lieu of sending forms, contractors may use facsimile, telephone or data link with the MPCAG to obtain recommendations on parts proposed for listing on the PPSL. Additional parts which are identified can be submitted at any time for review or accumulated for the Parts Control Board action. When the PCB is used, there is interface and coordination between personnel from the MPCAG, the acquisition activity and the contractor. They meet initially to establish working relationships, procedures and responsibilities, and subsequently to discuss and make decisions concerning appropriate topics dealing with parts control.

From information continuously received on the latest technology or new parts, the MPCAG provides new and updated standards and specifications. It serves as a central information

source for use in Defense-wide research and development programs, and its data bank is continually updated by information derived from the latest military contracts. Conversely, during reviews, the contractor reports back to the engineers on new technology which DOD should adopt as item improvements, and which can be standardized. Changes are also made to specifications. This permits DOD to maintain a state-of-the-art data base, applicable to all possible equipment.

However, approval to use a part on one piece of equipment does not automatically constitute approval for other new uses. Requirements and applications change, and military and industry standards are constantly evolving; therefore, it is not illogical that parts acceptable for use on one system may not be suited, or preferred, for use on another system. Of course it is impractical to expect that designers will be or remain fully knowledgeable of the range and status of the copious standardization documentation prepared or adopted by the military. This was one of the fundamental reasons for the evolution of the MPCAG.

#### MPCAG EFFECTIVENESS

##### Benefits have been significant

MPCAG services in support of military weapons systems/equipment contracts began in 1971. Since that time, the number of contracts and complexity increased through the 1980s. While

complexity remains and is likely to increase, the number of new systems is likely to taper off. However, if maintenance of the technology base is to be maintained, it is more important than ever to aggressively pursue parts control.

The benefits of the parts control system are being achieved in a number of ways. Many of these are highlighted or can be derived from information found throughout the references. When compared to the original objectives, the DOD PCP has achieved tremendous successes.

1. It has reduced the need for contractor prepared drawings and specifications for nonstandard items.

2. Logistical support costs have been eliminated that would have accrued had nonstandard parts entered the logistics system, such as cataloging unnecessary items and maintaining those and related items which are likely to enter later as a result of the nonstandard item.

3. Redundant, nonstandard parts testing has been reduced.

4. Related field maintenance requirements have been avoided through improved quality and availability.

5. It has enhanced substitutability and improved reliability through reduced proliferation.

6. The ease and rapidity with which a system can be sustained or restored to an operational status (maintainability) has been improved.

7. More parts of higher reliability are available.

8. Interoperability in joint and combined operations has

been improved.

9. Robust, redundant, quality sources of supply have increased.

10. Finally, it has improved system effectiveness through performance, reliability and availability.

#### Cost is the bottom line

Throughout the available literature, the effect of the DOD PCP on acquisition costs is just as pervasive as the benefits already noted, and perhaps best summarizes the most significant and over-arching advantage of the whole program. DODI 5000.2 states that the policies and procedures of the DOD PCP establish the basis for reducing the cost associated with the design, procurement, documentation, cataloging, maintenance, and reprourement of nonstandard parts. MIL-HDBK-402 states that cost avoidance is significant. MIL-STD-965 states that the DOD PCP objective is the achievement of design to cost and life cycle cost savings and cost avoidances.

While the actual value of the DOD PCP in cost benefit analysis has been the subject of a variety of studies, it remains difficult to quantify, due to subjectivity and complexity. However, the consensus over time has been with four major cost factors, as discussed in several of the references.<sup>36</sup>

(1) Documentation. Reduces design costs associated with the acquisition and/or development of nonstandard specifications and drawings. These costs can be from \$500 to \$6000+ per part

depending on a variety of factors.

(2) Testing. Eliminates redundant or unneeded functional capability and reliability testing of parts already qualified or substitutable. Depending on the tests required, these costs can range from \$5000 to literally tens of thousands of dollars.

(3) Logistics and provisioning. Reduces or eliminates costs starting with initial entry, cataloging and obtaining a National Stock Number, acquisition, product assurance handling, warehousing and transportation throughout the system, training, updating publications, through ultimate disposition; in other words, complete life cycle management costs. This area of operation and supply is perhaps the most difficult to calculate because of the number of factors which can influence the outcome. Various studies have been done and standardize the costs over a ten year life cycle. Current estimates are over \$3000/item.<sup>37</sup> This excludes the potential that other nonstandard items are likely to enter the system as a result of an initial nonstandard item.

(4) Maintenance. Reduces poor equipment performance and thus reduces maintenance costs that would have accrued from variety, quality and quantity of nonstandard items. The costs avoided per maintenance action currently range from \$225 to \$408 per action.<sup>38</sup>

Average cost figures for various FSCs and the methodology used in working out cost benefit analyses and cost avoidance reports are found in MIL-HDBK-402.<sup>39</sup> DOD is continually



assessing the cost avoidance of this program and has only begun to realize the significant benefits. There is still tremendous potential in terms of improving readiness, increasing effectiveness and reducing life cycle costs.

#### A case in point

One classic case study showed the significant potential of the PCP. A standardization document for the Air Force's F-15 was adopted in the early 1970s. This particular device was manufactured by four firms and assigned manufacturer's part numbers by six others. These were consolidated into one military standard. This part has continued to evolve in a modified form and subsequently other duplicate nonstandard items have been consolidated. In all, 255 items, each with an individual identifying number, have been consolidated into eight! As types of identifying numbers decreased, standard quantities could increase into more cost effective production runs. Without considering all the other cost avoidance for these items, the average price of just one of the eight dropped from \$10 to \$2 per part.<sup>40</sup> Such can be the extensive and significant benefit of a correctly operating DOD PCP.

#### CONCLUSIONS

Since specifications and standards represent such a readily available library of accepted design, assembly, test, inspection

and management techniques, will they save resources, avoid duplication of effort, coordinate all involved parties, and prevent reinvention of the wheel? The answer is only if they are rigorously applied, constantly reviewed and updated, adequately enforced, and most importantly, appropriately and enthusiastically coordinated.

The DOD PCP has achieved its initial objectives and continues to realize significant life cycle cost avoidances worth well over \$100 million per year.<sup>41</sup> This rate has been sustained since the mid-1970s and is expected to continue. The significant benefits of the PCP have already been discussed in detail. Additionally, the reduction of costs in a variety of ways is evident. In fact, the entire section of this research discussing MPCAG effectiveness is a tribute to the tremendous success of this program. The DOD PCP is a proven solution to parts proliferation and reduced life cycle support costs to military users and contractors alike. Piece parts are the basic elements from which all systems are built. The most complex weapons system has individual, discrete components which comprise its basic elements. This PCP not only saves money by specifying and documenting those basic elements, it promotes design efficiency and thus improves performance. Designers no longer face the daunting array of parts choices as in the past, thus freeing them to concentrate on the truly unique aspects and requirements of creative design, and to do so in the most productive areas. However, to realize the full potential of the

program, every person involved in DOD acquisition must be committed to its objectives and continue to look for ways to increase its efficiency and effectiveness.

As industry downsizes and reduces its production runs, it must exploit every possible method of reducing costs. There are thousands of spare parts which can be examined for sufficient similarities to allow cost-cutting reductions by eliminating or consolidating, as appropriate. Parts control alone will not save the production base, but it will contribute overall to a streamlined system which can keep the base warm and viable through design to cost and life cycle cost savings and cost avoidances.

#### RECOMMENDATIONS

The DOD PCP and the MPCAG have continued to prove their effectiveness since their inception. The increased use of standardized items will improve support, save money and directly and positively enhance materiel readiness. This concept should continue to receive the wholehearted support of all involved personnel and agencies.

1. As force downsizing continues, there is a tendency to try to keep fewer of each item rather than eliminate whole items. Likewise, the desire for new items is greater than looking for ways to reduce the numbers and varieties of new items entering the system. In each case, the appropriate MPCAG must

aggressively review the proposed PPSL and make timely recommendations to the acquisition activity.

2. Standardization policy must be stressed as early as possible during initial design phases and reviews, when system design is the most flexible. Many times new parts are selected when military standard parts are available with only minor size and/or configuration differences. Early review by the responsible MPCAG will aid this effort.

3. Improvements in computer programs and computer-aided design continue to provide potential for improvements in data base management for design engineers. The DLA must ensure the MPCAGs are directed to pursue the most up-to-date methods available so that design engineers are provided with the most efficient, user-friendly parts control system possible. Working level design engineers must be able to interrogate the parts data base using a variety of characteristics and descriptions. This data base must be interactive with the DOD supply catalog, government program managers, MPCAGs and the contractor's parts data base.

4. MPCAGs must rapidly process contractor requests for parts additions to the PPSL. If not, the contractor will simply attempt to bypass MPCAG recommendations. If the PM has time constraints he will likely support the contractor, even if it means using a non-standard part.

5. The acquisition activity and the MPCAG must make maximum use of the contractor's recommendations for suitability of parts

as long as they feel the contractor is genuinely adhering to the spirit of the PCP. Goodwill must be translated into savings for the government and the contractor alike. While the program is mandated, all parties must work with a spirit of cooperation for the benefit of all concerned.

6. PMs must maintain a strong working relationship with the MPCAGs by providing MPCAG engineers with technical data which will allow complete and timely evaluations of recommended parts. Only by accurately identifying form, fit and function limitations can the PM insure that the MPCAG will have the information necessary to provide proper recommendations.

## ENDNOTES

1. Office of the Inspector General, Department of Defense, "DOD Parts Control Program," Audit Report No. 85 - 075, February 20, 1985, p. 27.

2. Department of Defense Instruction 4120.19, "Department of Defense Parts Control System," Washington, D. C., 16 December 1976.

(NOTE: DODI 4120.19, the key to the effective implementation of the PCP from the very beginning, was later revised 27 June 1984 as a result of the Endnote 1 audit. It was revised again 30 October 1985 to consolidate guidance from a variety of references and to update the policy, procedures and responsibilities for mandatory application of the DOD PCP. The final revision on 6 July 1989 was canceled when it was included in the comprehensive DODI 5000.2, "Defense Acquisition Management Policies and Procedures," dated 23 February 1991, Part 6, Section R.)

At this point, several definitions are in order.

A DOD Directive provides policies and procedures and requires actions by and establishes the responsibilities of agencies to execute the directive being promulgated.

A DOD Instruction amplifies DOD policy in support of the basic objectives and policies stated in higher order references (DOD Directives or United States Code) or other DODIs. The further purpose is to implement DOD programs by establishing and instructing pertinent policies, procedures and responsibilities.

A Military Standard (discussed further in endnote 4) fully implements the guidelines and requirements of a DODI. It describes the specific procedures to be followed and outlines the standards and requirements which are expected to maintain compliance. Military Standards are established by the Department of Defense.

3. IG Report 85-075, p. 1

"Title 10, United States Code, Chapter 125, requires that the Secretary of Defense shall develop a single catalog system and related program of standardizing supplies for the Department of Defense. In standardizing supplies, the law provides that to the highest degree practicable, standardized items shall be used throughout DOD by developing and using single specifications, eliminating overlapping and duplicate specifications, and reducing the number of sizes and kinds of items that are generally similar. (p.1)

"DOD Directive 4120.3 establishes the Defense Standardization and Specification Program and provides that standardization shall be an essential consideration during system and equipment acquisition and that military operational requirements shall be satisfied to the maximum practical extent through the use of existing acceptable commercial and military designs, products and practices. (p.1)

4. Military Standard 965 w/ Change 1, "Parts Control Program," Washington, D. C., 15 April 1977.

The objectives of the program, as laid out in this MIL STD, were to:

- o Conserve resources and reduce life-cycle cost by reducing the varieties of component parts.

- o Promote the application of established standard parts or parts with multiple application of known performance during the design, development, production, or modification of equipment and weapons systems.

- o Apply engineering techniques that may assist system or equipment acquisition managers and their contractors in the identification and selection of established standard parts or parts with multiple application to enhance inter- or intradepartmental systems commonality, interchangeability, reliability, maintainability, standardization, and interoperability.

- o Achieve optimum standardization of piece parts which, in turn, may lead to reduced prices as a result of greater demand for standard parts, reduction of varieties of parts in the inventory, increased production runs, and enhanced competition through multiple sources.

5. IG Report 85-075, p. i.

6. Ibid, p. i.

7. Washington Dateline, The Associated Press, Tuesday PM cycle, 2 April 1985.

8. Richard Halloran, "Pentagon Audit Finds Cost-Cutting Steps Ignored," The New York Times, Late City Final Edition, 4 April 1985, sec. A, p. 29, column 4.

9. Directorate of Engineering Standardization, Defense Electronics Supply Center, Cost Benefit Reporting For DOD Parts Control System, Dayton, Ohio, 15 August 1977.

10. Cooper, COL William L., Jr., "The DOD Parts Control System," Journal of the Society of Logistics Engineers, September 1978, pp. 30 - 32.

11. Vaughn, LTG (ret) Woodrow W., "Saving Time and Dollars Through Parts Control," Defense Management Journal, July 1978, pp. 39 - 41.

12. Procurement Association, Incorporated. Government Prime Contracts and Sub-Contracts Service, Volume III. Covina, California, 1978, p. I-3-1.

13. Ibid, p. I-3-7.

14. United States Army Tank-Automotive Command, Army Materiel Command, "Guidelines for the Implementation of the DOD Parts Control Program," Military Handbook 402 (MIL-HDBK-402), Washington D. C., 29 June 1988, p. 2-1.

16. Swanson, Donald K. and Gastineau, Charles E., "Parts Control Equals Cost Control," Defense Electronics Supply Center, undated, p. 4.

16. Defense Electronics Supply Center, "The Department of Defense Parts Control System: Pilot Implementation of a DOD Test Program by the Military Parts Control Advisory Group (MPCAG)," 1 October 1973, p. 15.

17. Swanson and Gastineau, "Parts Control Equals Cost Control, p. 7.

18. Swanson, Donald K. and Gastineau, Charles E., "Parts Control = Quality + Increased Productivity, 1981 Proceedings Annual Reliability and Maintainability Symposium, p. 1.

19. Swanson and Gastineau, "Parts Control Equals Cost Control," p. 3.

20. DOD Parts Control System Pilot, p. 1.

21. Fox, Lester and Allan, Jeffrey S., "Tailoring Specifications and Standards to Today's Needs," Defense Management Journal, March - April 1977, pp. 19 - 23.

22. Ibid, pp. 11 - 16.

23. Fox and Allan, Defense Management Journal, p. 12.

The investigation conducted by the Defense Science Board task force highlighted the need for closer management attention on controlling the format, content, proliferation, and application of nonstandard specifications and standards. The defense



standardization program is commodity oriented and defined by federal supply classes. The noncommodity-oriented standardization documents (those not fitting within specific FSCs) had been somewhat neglected, resulting in overlapping, repetitive documentation and voids. To correct this problem, the task force recommended that a comprehensive, top-level management program be initiated which would identify specific management standardization areas; integrate all ongoing projects in these areas together with their objectives, schedules, and required resources; and define future necessary projects and requirements for improving documentation control.

The task force developed an initial listing of nine DOD standardization areas needing immediate attention:

1. General design requirement specification.
  2. Environmental requirements and test methods.
  3. Reliability and maintainability.
  4. Quality control.
  5. Human factors and safety.
  6. Documentation.
  7. Configuration control.
  8. Integrated logistics support.
  9. Packing, packaging, preservation and transportation.
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24. DODI 4120.19, p. 2.
  25. Vaughn, Defense Management Journal, p. 40.
  26. Cooper, Journal of the Society of Logistics Engineers, p. 31.
  27. Department of Defense Directive 4120.21, "Specifications and Standards Application," Washington, D. C., 9 April 1977.
  28. Vaughn, Defense Management Journal, p. 39.
  29. Military Standard 965A w/ Notices 1-3, "Parts Control Program," Washington, D. C., 13 December 1985, p. 9.
  30. Department of Defense Instruction 5000.2, "Defense Acquisition Management Policies and Procedures," Washington, D. C., 23 February 1991, Part 6, Section R(DOD Parts Control Program), pp. 6-R-1 and 2.
  31. Office of the Under Secretary of Defense for Acquisition, "An Overview of the DOD Parts Control Program," Defense Standardization and Specification Program SD - 7, Washington, D.C., 12 August 1988, p. 4.
  32. DODI 5000.2, p. 6-R-2.

33. MIL-STD-965A, pp. 3 and 3a.

The PPSL is initially a proposed list. Once approved, it becomes the governing document for part selection for the subject contract in order to control the scope of total part population, compress the variety of part types, and to direct contract/subcontract designers to approved parts.

The GFB/PL is a list of approved standard parts to be used as an initial source in the generation of a PPSL and for subsequent design selections. It is the first order of precedence when selecting parts for equipment design, and as such, parts selected from it require no further evaluation. The goal of the GFB/PL is to minimize the number of parts submittals, reduce part procurement problems, and provide standardization guidance. (NOTE: In the early days of the MPCAG, excessively long lists of unscreened parts on proposed PPSLs caused tremendous difficulties because of peak workloads in the face of contractual deadlines. This very situation improved the process through the use of GFB/PLs.

34. Ibid, p. 3.

35. Office of the Under Secretary, SD - 7, p. 5.

A PCB is used when large systems are acquired. This procedure assists the contractor early in the design process by helping identify standard parts prior to formal submission of the PPSL.

36. Office of the Under Secretary, SD - 7, pp. 12 - 15.

Swanson and Gastineau, "Parts Control Equals Cost Control," pp. 7 - 12.

MIL-HDBK-402, Appendix F.

37. MIL-HDBK-402, p. 3-3 and Appendix F.

38. Ibid, p. 3-3.

39. Ibid, p. 3-2, Chapter 7 and Appendix F.

40. Office of the Under Secretary, SD - 7, pp. 13 - 15.

41. Ibid, p. 13.